AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



MARK SCHEME

4.5.6.1.5 ACCELERATION (PACK 2)

SCORE	PERCENTAGE
/83	%

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Q1.

(a) AB

for 1 mark

1

(b) (i) 0.7

for 1 mark each

1

(ii) 16.8

gains 2 marks

2

but correct working
(d = v.t, d = 24 × 0.7, or in terms of area under graph)

gains 1 mark

1

(c) a = (v-u)/t
= 24/4
= 6
m/s^2

(see marking of calculations)

(can work in terms of graph gradient)

4

(d) d = v.t
= 24/2 × 4
= 48

(see marking of calculations)

(can work in terms of area under graph)

3

(e) F = ma
= 800 × 6
= 4800

(see marking of calculations)

3

[15]

Q3.

(a) mass

1

(b) work (done) = force (applied) × distance (moved in the direction of the force)

*do **not** accept correctly substituted figures for this equation mark*
*accept W = Fs **or** W = Fd **or** W = Fh (well done) = force × height)*
mark formula independently

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1

1 000 000 × 15

allow 1 000 000 × $\frac{15}{1000}$

1

= 15 000 000

= 15 000

1

J / joules

KJ / kilojoules

1

allow 1 000 000 × 1500

= 15 00 000 000 for 1 mark only – no unit mark

allow 3 marks for correct answer if no working / correct working is shown

(c) **Quality of written communication**

The answer to this question requires ideas in good English, in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme

Max.4 if ideas not well expressed

A – **B** not moving

*accept stationary **or** at rest*

1

B - C acceleration **or C** – **D** acceleration

accept increases speed / velocity accept gets faster

1

comparison made that the acceleration **B – C** is less than **C** – **D**

*accept comparison made that the acceleration **C-D** is greater than **B-C***

1

D – E constant velocity

*accept steady speed **or** at 0.4 m/s*

1

E – **F** deceleration

accept decreases speed / velocity accept gets slower

1

[10]

Q4.

(a) 7.5

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correct answer with no working = 3 if incorrect allow 1 mark for (change in velocity from graph =) 15

1 mark for $\frac{change\ in\ velocity}{time\ taken}$

2 marks for $\frac{15}{2}$

N.B. correct answer from the incorrectly recalled relationship $\frac{distance}{time}$ *= 2 marks*

3

(b) (4 – 5 seconds) the bungee jumper slows down (decelerates)

1

(the rubber cord) stops the fall

1

(5 – 6 seconds) the bungee jumper starts moving (accelerating) upwards (in the opposite direction)

max 2 marks if no correct indication of time

1

[6]

Q5.

(a) (i) acceleration / speeding up

do not accept acceleration increases

1

(ii) constant / steady velocity

accept constant / steady speed

1

(b) 10

3

m/s^2 or ms^{2-}

reject ms^2

if answer not correct then allow 1 mark for

acceleration = $\frac{change\ in\ velocity}{time\ taken\ for\ change}$

and allow 1 mark for $\frac{40\ (m/s)}{4(s)}$

1

[6]

Q6.

(a) WD = force × distance **or** 6 × 2

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gains 1 mark

but 12 *gains 2 marks*
units J/joules [credit Nn]
for 1 mark

3

(b) 0.6 (i.e. using the **recalled** 10N/kg)
gains 1 mark

but evidence of force = mass × acceleration
or of correct substitution e.g. 6/9.8
gains 2 marks

but 0.61 (2...)
gains 3 marks

3

(c) *any reference to*
initial acceleration due to gravity
(force due to) friction/air resistance
each for 1 mark

ideas that
this increases as speed increases
forces eventually balance
each for 1 further mark

9

[9]

Q7.

(a) **evidence of* acceleration = $\frac{\text{change in speed}}{\text{time}}$ or $\frac{0.6}{3}$
gains 1 mark

but 0.2
gains 2 marks

units m/s^2
for 1 mark

3

(b) (i) 2000 **or** 1960
for 1 mark

1

(ii) *evidence of* power = $\frac{\text{work done}}{\text{time taken}}$ **or** weight × speed (*credit figures*)/ $\frac{25}{0.6}$

(iii) $\frac{25}{0.6}$
gains 1 mark

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but 1200/1176 **or** *figure consistent with (b)(i)*
gains 2 marks

2

(c) *evidence of* force = mass × acceleration **or** 200 × 0.3
gains 1 mark

but 60
gains 2 marks

but 60 + weight of girder (2060/2020*) *(or figure consistent with (b)(i))*
gains 3 marks

3

[9]

Q8.

(a) A = speeding up
[Accept 'accelerating / acceleration / going faster]

B =moving at a steady speed
[Accept 'constant speed']

C = slowing down
[Accept 'going slower' / decelerating]
each for 1 mark

3

(b) acceleration = $\frac{\text{change in speed/velocity}}{\text{time taken}}$

NB if formula given must be correct

or $\frac{10}{4}$
gains 1 mark

but 2.5
gains 2 marks

unit m/s^2 **or** metres per second squared
or metres per second per second
for 1 mark

or m/s^{-2}
[Credit even if no / an incorrect numerical answer is given]

3

[6]

Q9.

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(a) *evidence of* $\frac{\text{change in speed}}{\text{time taken}}$ *or* $\frac{3}{12}$

gains 1 mark

but 0.25 **or** ¼

gains 2 marks

2

(b) *evidence of* $\frac{\text{work done}}{\text{time taken}}$ *or* $\frac{2400}{12}$

gains 1 mark

but 200

gains 2 marks

2

(c) *idea that*

second car has a bigger mass
(allow bigger weight/heavier)

gains 1 mark

but
second car has 1.5 times bigger mass
or
second car has mass of 1200 kg

gains 2 marks

2

(d) friction/resistance increases with speed

gains 1 marks

but
friction with/resistance of <u>air</u> increases with speed

gains 2 marks

- increase in speed because driving force greater than friction
- steady speed when friction = driving force

or
increases in speed until friction = driving force

each for 1 further mark to maximum of 3

3

[9]

Q10.

(a) acceleration = $\frac{\text{change in speed/velocity}}{\text{time taken}}$

or $\frac{10}{4}$

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gains 1 mark
do not penalise if <u>both</u> of these present
but 'change in' omitted from formula

but
2.5

gains 2 marks

unit m/s^2 **or** metres per second squared

or metres per second per second

or ms^{-}*
for 1 mark

3

(b) *evidence* of using area under graph or distance <u>average</u> speed × time
or

$10 \times 4 \times \frac{1}{2}$

gains 1 mark

but
20

gains 2 marks

units metres / m^{-2}*
for 1 mark

3

(c) force = mass × acceleration **or** 75 × 25
gains 1 mark

but
1875

gains 2 marks

**NB Correct unit to be credited even if numerical answer wrong or absent.*

2

[8]

Q11.

(a) reference to

- weight / force of gravity / acting downwards
- unbalanced (by any upwards force)

for 1 mark each

2

(b) *ideas that* forces balance(d)
gains 1 mark

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but
weight / force of gravity / downwards force balanced by friction / air resistance / drag / upwards force

gains 2 marks

latter increases with speed

(*accept* arrows or relevant length and direction if clearly labelled, as answers to parts (a) and (b))

for 1 further mark

3

[5]

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